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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/524,525	08/18/2005	Martin Hausner	BEET-09	1134
26875 7590 11/03/2009 WOOD, HERRON & EVANS, LLP 2700 CAREW TOWER 441 VINE STREET CINCINNATI, OH 45202				
EXAMINER				
AHMED, SIAMIM				
ART UNIT		PAPER NUMBER		
1792				
MAIL DATE		DELIVERY MODE		
11/03/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/524,525

Applicant(s)

HAUSNER, MARTIN

Examiner

Shamim Ahmed

Art Unit

1792

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 September 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 24-45, 47, 49 and 50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 24-45, 47, 49 and 50 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB-08)
Paper No(s)/Mail Date 4/13/09
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/1/09 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 24-45, 47, 49 and 50 have been considered but are moot in view of the new ground(s) of rejection. As to Yin et al (patent '901), applicants argue that the combination with Ye et al (patent '687) would destroy the intended purpose and function of the Yin et al reactor having flat or dome-shaped coil.

In response to the argument, examiner states that the argument is not persuasive because Yin et al is introduced to show the requirement of maintaining a distance between the coil and the substrate to be processed, not to provide the teaching of the shape of the coil, whereas Ye et al explicitly teach that the inductive coil could be any shape such as planar, dome-shape or cylindrical and they can be oriented or located within the chamber to achieve a desired power deposition pattern (col.7, lines 28-33) and also illustrate that the coil located interior of a reactor advantageous over the typical inductive coil wrapped around the exterior of the reactor (col.6, lines 57-63).

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 47 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 47 recites the broad recitation "**more than 90%**", and the claim also recites "**more than 95%**" and "copper amount between 0.5 and 2% by weight, preferably below 1% by weight" which is the narrower statement of the range/limitation.

Similar analysis applies for the silicon and titanium content, even though they are optional limitation.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claim 47 is rejected under 35 U.S.C. 102(b) as being anticipated by Nakagawa et al (5,599,743).

Nakagawa et al teach a semiconductor wafer (1) and a masking layer (4) of aluminum alloy film (col.1, lines 19-27 and figure 1), in which the aluminum alloy comprises 0.5 to 1 weight percent of silicon or the alloy could comprises copper in the range of 0.1-4 wt. Percent and the aluminum content is more than 90% by weight or at least 95% by weight (col.3, lines 49-59).

It is noted that titanium content is optional in the aluminum alloy.

Nakagawa et al teach the masking layer is applied to a semiconductor substrate to be etched, even though the etching is not positively claimed (col.4, lines 1-12).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 24-45 and 49-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Song et al (6,821,901) in view of Ye et al (6,270,687) and further in view of Yin et al (6,270,617).

Song et al disclose a silicon etching process utilizing an inductively coupled plasma etching through a masking layer of aluminum, wherein the etching is dry etching and the etching is performed in Bosch process such as etching and passivation steps are carried out alternatively (col.5, lines 50-col.6, line 7).

Song et al teach the etching create an etched cavity of about 250 μm deep (col.6, lines 7-9).

Song remains silent regarding the introduction of the inductively coupling power provided by an inductive coupling coil in the form of a cylinder and having a lower edge.

However, Ye et al teach several advantages over conventional inductively coupled plasma etch reactors by placing the inductive coil antenna within the chamber for preventing unwanted changes in the plasma characteristics and as well as optimizing power deposition, wherein the coil obviously having a lower edge as of figures 4A-4F_(col.6, lines 57-67, col.7, lines 34-42 and col.12, lines 60-66).

Ye et al also teach that the coil related factors such as shape. Location and orientation which can be manipulated in an effort to optimize the power deposition and etchant species diffusion patterns within the chamber (col.13, lines 16-18). So, it would

have been obvious to optimize the distance between the inductive coupling and the substrate.

Ye et al explicitly teach that the inductive coil could be any shape such as planar, dome-shape or **cylindrical** and they can be oriented or located within the chamber to achieve a desired power deposition pattern (col.7, lines 28-33) and also teach that the coil located interior of a reactor advantageous over the typical inductive coil wrapped around the exterior of the reactor (col.6, lines 57-63).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Ye et al's teaching into Song et al's process for preventing unwanted changes in the plasma characteristics and as well as optimizing power deposition as suggested by Ye et al.

Ye et al shows that a distance is maintained between the substrate and the lower edge of the coil (see figures 4A-4F), which would have been more than 8cm and easily reads on the limitation of at least 8 cm (the claimed lower range).

Additionally, Modified Song et al may differs from the instant invention in that the substrate is kept at a distance of at least twice the mean free path length of the plasma atoms or at least 8 cm from the inductive coupling.

However, Yin et al disclose a RF plasma reactor having induction coil above the substrate to be processed and also illustrate that **the distance between the substrate and the inductive coil provides major roles in the plasma uniformity by increasing the ion density across the wafer surface; the distance between the ceiling and the substrate is with in the range of 4-12 inches, which equates 10-30**

cm (col.1, lines 20-24 and col.2, lines 61-67), and the aforementioned reads on the claimed limitation of the substrate is kept at a distance from the inductive coupling-----
--- or at a distance of at least 8 cm from the inductive coupling.

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Yin et al's teaching into modified Song et al's process for producing uniform plasma on the surface regions as taught by Yin et al.

As to claim 26, Yin et al teach the pressure can be varied to control the ion distribution across the wafer surface and that could be about 10 mTorr or less than 20 mTorr (col.11, lines 44-53), which reads on the claim pressure range.

As to claim 27, depositing the material all the way across to the other side of the substrate is merely one of several obvious possibilities from which a person skilled in the art would select according to the circumstances as illustrates in Song et al

As to claim 30, Song et al teach that aluminum is vapor deposited by generally known method such as PVD (col.5, lines 19-21).

As to claims 49- 50, it would have been obvious to optimize the etched depth, which is dependent on the type of device to be formed.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on Mon-Thurs day (7:00-3:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Shamim Ahmed
Primary Examiner
Art Unit 1792

SA
October 30, 2009

/Shamim Ahmed/
Primary Examiner, Art Unit 1792